

Claim Amendments:

- 1) (Currently Amended) An optic probe comprising:

a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends, the tubular body having an interior surface with internal screw threading on the tubular body interior surface;

an optical sensing element at the distal end of the tubular body; and

a resilient seal between the optical sensing element and the distal end of the tubular body sealing the interior of the tubular body from an exterior environment of the probe, a compression tube inside the tubular body between the tubular body internal screw threading and the optical sensing element, the compression tube having an exterior surface in sliding engagement with the interior surface of the tubular body; and

a compression ring inside the tubular body, the compression ring being screw threaded into the internal screw threading of the tubular body and engaging against the compression tube.

- 2) (Original) The optic probe of Claim 1, further comprising:

the seal engaging around a portion of the optical sensing element.

- 3) (Original) The optic probe of Claim 1, further comprising:

the tubular body having an interior surface that surrounds the hollow interior and the seal engaging against the interior surface.

- 4) (Original) The optic probe of Claim 1, further comprising:

the resilient seal being compressed between the optical sensing element and the tubular body.

- 5) (Original) The optic probe of Claim 1, further comprising:
the optical sensing element being a reflective crystal having at least two surface areas that are oriented at an angle to each other.
- 6) (Original) The optic probe of Claim 1, further comprising:
at least a portion of the optical sensing element having a conical shape.
- 7) (Original) The optic probe of Claim 1, further comprising:
at least a portion of the optical sensing element having a frustum shape.
- 8) (Original) The optic probe of Claim 1, further comprising:
a plurality of fiber optic cables extending through the interior of the tubular body, each cable having a proximal end adjacent the tubular body proximal end and an opposite distal end adjacent the tubular body distal end; and
an optical assembly inserted into the tubular body interior adjacent the tubular body distal end, the optical assembly having a plurality of holes extending axially through the optical assembly and the distal ends of the plurality of fiber optic cables being positioned and supported in the plurality of holes.
- 9) (Original) The optic probe of Claim 8, further comprising:
a temperature sensor in the tubular body interior.

- 10) (Original) The optic probe of Claim 9, further comprising:
the temperature sensor being mounted on and supported by the optical assembly.
- 11) (Original) The optic probe of Claim 8, further comprising:
a pressure sensor in the tubular body interior.
- 12) (Original) The optic probe of Claim 11, further comprising:
the pressure sensor being mounted in the tubular body interior adjacent the optical assembly.
- 13) (Currently Amended) ~~The optic probe of Claim 8, further comprising:~~
An optic probe comprising:
a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends,
an optical sensing element at the distal end of the tubular body;
a resilient seal between the optical sensing element and the distal end of the tubular body sealing the interior of the tubular body from an exterior environment of the probe;
a plurality of fiber optic cables extending through the interior of the tubular body, each cable having a proximal end adjacent the tubular body proximal end and an opposite distal end adjacent the tubular body distal end;

an optical assembly inserted into the tubular body interior adjacent the tubular body distal end, the optical assembly having a plurality of holes extending axially through the optical assembly and the distal ends of the plurality of fiber optic cables being positioned and supported in the plurality of holes;

the optical assembly having a first portion with an exterior surface that engages with the tubular body and a second portion that projects axially outwardly from the first portion and is spaced from the tubular body; and

the optical sensing element having an end surface that opposes the optical assembly and a cavity recessed into the optical sensing element from the end surface, and the optical assembly second portion extending into the cavity.

14) (Original) The optic probe of Claim 13, further comprising:

a resilient seal between the optical sensing element end surface and the optical assembly first portion.

15) (Currently Amended) ~~The optic probe of Claim 8, further comprising:~~
An optic probe comprising:

a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends,

an optical sensing element at the distal end of the tubular body;

a resilient seal between the optical sensing element and the distal end of the tubular body sealing the interior of the tubular body from an exterior environment of the probe;

a plurality of fiber optic cables extending through the interior of the tubular body, each cable having a proximal end adjacent the tubular body proximal end and an opposite distal end adjacent the tubular body distal end;

an optical assembly inserted into the tubular body interior adjacent the tubular body distal end, the optical assembly having a plurality of holes extending axially through the optical assembly and the distal ends of the plurality of fiber optic cables being positioned and supported in the plurality of holes; and

a transparent optical window mounted in the tubular body interior axially between the optical assembly and the optical sensing element.

16) (Original) The optic probe of Claim 15, further comprising:

the optical window and the optical sensing element being axially spaced from each other with there being a void in the tubular body between the optical window and the optical sensing element, and an opening in the tubular body communicating the void with the exterior environment of the probe.

17) (Original) The optic probe of Claim 15, further comprising:

a resilient seal between the optical window and the distal end of the tubular body sealing the interior of the tubular body from the exterior environment of the probe.

18) (Currently Amended) ~~The optic probe of Claim 1, further comprising:~~

An optic probe comprising:

a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends,

an optical sensing element at the distal end of the tubular body;

a resilient seal between the optical sensing element and the distal end of the tubular body sealing the interior of the tubular body from an exterior environment of the probe;

the distal end of the tubular body being a tubular tip guard secured to the tubular body distal end, with an exterior seam between the tubular tip guard and the tubular body having been welded and later polished providing a continuous, having a smooth, cylindrical exterior surface between the tubular tip guard and the tubular body.

19) (Original) The optic probe of Claim 18, further comprising:

the optical sensing element being contained in the tubular tip guard.

20) (Original) The optic probe of Claim 19, further comprising:

the resilient seal being between the optical sensing element and the tubular tip guard.

21) (Original) The optic probe of Claim 1, further comprising:

the resilient seal being an o-ring.

22) (Original) The optic probe of Claim 18, further comprising:

the tubular tip guard having an opening exposing the optical sensing element to the exterior environment of the probe through the tubular tip guard opening.

23) (Currently Amended) ~~The optic probe of Claim 1, further comprising:~~

An optic probe comprising:

a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends,

an optical sensing element at the distal end of the tubular body;

a resilient seal between the optical sensing element and the distal end of the tubular body sealing the interior of the tubular body from an exterior environment of the probe;

a cleaning cap on the tubular body distal end, the cleaning cap extending axially past and enclosing the optical sensing element and having at least one side opening to an interior bore of the cleaning cap; and,

the optical sensing element being inside the cleaning cap interior bore and adjacent the at least one side opening.

24) (Original) The optic probe of Claim 23, further comprising:

the cleaning cap having an exterior surface; and,

a seal mounted on the cleaning cap exterior surface.

25) (Currently Amended) An optic probe comprising:

a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends, the tubular body having an interior surface with internal screw threading;

a plurality of fiber optic cables extending through the interior of the tubular body, each fiber optic cable having a proximal end adjacent the tubular body proximal end and an opposite distal end adjacent the tubular body distal end; and

an optical sensing element at the distal end of the tubular body, the optical sensing element having an end surface that opposes the distal ends of the plurality of fiber optic cables and the optical sensing element having a conical surface that is axially opposite the end surface;

a compression tube inside the tubular body between the internal screw threading and the optical sensing element, the compression tube engaging in sliding engagement with the tubular body internal surface; and,

a compression ring inside the tubular body and screw threaded into the internal screw threading and engaging against the compression tube.

26) (Original) The optic probe of Claim 25, further comprising:
the conical surface being on a frustum shaped portion of the optical sensing element.

27) (Original) The optic probe of Claim 25, further comprising:
an optical assembly inserted into the tubular body interior, the optical assembly having a plurality of holes extending axially through the optical assembly and

the distal ends of the plurality of fiber optic cables being positioned and supported in the plurality of holes.

28) (Original) The optic probe of Claim 27, further comprising:

a temperature sensor in the tubular body interior and supported on the optical assembly.

29) (Original) The optic probe of Claim 28, further comprising:

a pressure sensor in the tubular body interior.

30) (Original) The optic probe of claim 29, further comprising:

the pressure sensor being mounted in the tubular body interior adjacent the optical assembly and the optical assembly being mounted in the tubular body interior for movement of the optical assembly relative to the tubular body and relative to the pressure sensor.

31) (Currently Amended) ~~The optic probe of claim 27, further comprising:~~

An optic probe comprising:

a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends;

a plurality of fiber optic cables extending through the interior of the tubular body, each fiber optic cable having a proximal end adjacent the tubular body proximal end and an opposite distal end adjacent the tubular body distal end;

an optical sensing element at the distal end of the tubular body, the optical sensing element having an end surface that opposes the distal ends of the plurality of fiber optic cables and the optical sensing element having a conical surface that is axially opposite the end surface;

an optical assembly inserted into the tubular body interior, the optical assembly having a plurality of holes extending axially through the optical assembly and the distal ends of the plurality of fiber optic cables being positioned and supported in the plurality of holes; and,

the optical sensing element end surface having a cavity that is recessed into the end surface and the optical assembly having a portion that extends into the cavity.

32) (Currently Amended) ~~The optic probe of Claim 27, further comprising:~~
An optic probe comprising:

a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends;

a plurality of fiber optic cables extending through the interior of the tubular body, each fiber optic cable having a proximal end adjacent the tubular body proximal end and an opposite distal end adjacent the tubular body distal end;

an optical sensing element at the distal end of the tubular body, the optical sensing element having an end surface that opposes the distal ends of the plurality of fiber optic cables and the optical sensing element having a conical surface that is axially opposite the end surface;

an optical assembly inserted into the tubular body interior, the optical assembly having a plurality of holes extending axially through the optical assembly and the distal ends of the plurality of fiber optic cables being positioned and supported in the plurality of holes; and,

a transparent optic window mounted in the tubular body interior in a position between the optical assembly and the optical sensing element.

33) (Original) The optic probe of Claim 32, further comprising:

the optical window and optical sensing element being axially spaced from each other by a void in the tubular body interior between the optical window and the optical sensing element and an opening in the tubular body communicating the void with the exterior environment of the probe.

34) (Currently Amended) ~~The optic probe of Claim 25, further comprising:~~
An optic probe comprising:

a tubular body having a hollow interior with a center axis and an axial length with opposite proximal and distal ends;

a plurality of fiber optic cables extending through the interior of the tubular body, each fiber optic cable having a proximal end adjacent the tubular body proximal end and an opposite distal end adjacent the tubular body distal end;

an optical sensing element at the distal end of the tubular body, the optical sensing element having an end surface that opposes the distal ends of the plurality of

fiber optic cables and the optical sensing element having a conical surface that is axially opposite the end surface; and,

the distal end of the tubular body being a tubular tip guard secured to the tubular body by a weld that has been later polished, the tubular body and the tip guard thereby having a smooth, cylindrical exterior surface.

35) (Original) The optic probe of Claim 34, further comprising:

the optical sensing element being contained in the tubular tip guard.

36) (Original) The optic probe of Claim 35, further comprising:

the tubular tip guard having an opening exposing the optical sensing element to an exterior environment of the probe.